

### ABSTRACT

A plasma processing system for performing atomic layer deposition (ALD) including a process chamber, a substrate holder provided within the process chamber, and a gas injection system configured to supply a first gas and a second gas to the process chamber. The system includes a controller that controls the gas injection system to continuously flow a first gas flow to the process chamber and to pulse a second gas flow to the process chamber at a first time. The controller pulses a RF power to the substrate holder at a second time. A method of operating a plasma processing system is provided that includes adjusting a background pressure in a process chamber, where the background pressure is established by flowing a first gas flow using a gas injection system, and igniting a processing plasma in the process chamber. The method includes pulsing a second gas flow using the gas injection system at a first time, and pulsing a RF power to a substrate holder at a second time.